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CORPORATE SECTOR PURCHASE PROGRAMME - ANNOUNCEMENT AND REAL EFFECT ON CORPORATE YIELDS

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Abstract

Prolonged periods of low interest rates and inflation forced ECB to interfere into the economy again. This time with direct interference into the corporate sector by Corporate Sector Purchase Programme (CSPP). The main purpose is to push inflation rate up to 2%. The objective of this research is to understand better the consequences and main implication of the instability in the real economy, as low interest rate and inflation, with deep focus on corporate sector. Based on the model implemented, there will be discussed real and expected movements on the corporate yield spread during the CSPP.

Keywords: CSPP, QE, Corporate Yield, Eurozone

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Introduction

Long periods of weak economic growth around the global economy, low inflation rates and consequent uncertainty about the future, prompted the global economic players to interfere in the economy. Some years ago, during the Lehman Brothers for example, in case of some turbulence in the market, central banks (CB) typically changed short-term interest rate accordingly to the needed effect, and surprisingly it worked. However, after long periods of aggressive bet on this sort of policy, the lower bound achieved its water-line without significant positive changes in the economy, consequently took economy players one more time to rethink the strategy[1]. It was important and inevitable to develop backup plan to invert the undesirable situation in the economy. For this purpose, there was developed the unconventional-monetary programme called Quantitative Easing - programme based on direct injection of money into economy. The main objective is also, and again, to influence the level of interest rates as before,

[1] During the last years, CBs from different continents (BoJ, ECB, others) have cut the interest rates into negative territory, justified by the low inflation that take investors to accept lower returns.

however this time in an indirect way. In the past, there were implemented different types of QE focused on direct and indirect effects of specific financial assets at different parts of the world. Though, here the objective is to study the effect of the most recent programme developed by ECB, called **CSPP – Corporate Sector Purchase Programme**.

From beginning of APP (Asset Purchase Programme) and before CSPP, there was already verified a significant impact not just in the yields on government debt[2], but also pushed down all markets, even the riskier assets. "The asset class is really becoming juiced out," said Mr. Thibault Colle, a strategist at UBS. Consequently, it made investor search for more profitable and riskier solutions, and the one is a corporate bond market. Also, given the relatively low yields on corporate debt, made corporations to issue in high volumes, given the increased appetite of investors[3].

On the 8th of June 2016, European Central Bank (ECB) started to implement the fourth step on the Extended APP, just two weeks before the UK referendum, in this way continued the implementation of the monetary policy of recent years. This time strictly directed to the corporates through the CSPP in order to reinforce the fight against the deflationary periods and instability on the financial markets in the Euro area. There are many who believe, as for example Ardo Hasson, ECB Governing Council member, that "channels that work directly through enterprises and banks (refereeing to the corporate bonds) are the most likely channels to have a significant impact", compared to the previous government bonds based programmes. Thus, here is the first motivation of why this research: Did CSPP have significant effect compared to previous programmes? To contrast, on the other hand there surged various doubts about the effectiveness of the QE, as during last years of QE running there were not verified significant positive results, and consequently, concerns regarding the possible negative impact of the QE

[2] Government Bonds were the main target of previous programmes and nowadays are on their lows, and in some cases negatives.

[3] Investment grade issuance jumped 41% to €97bn and high yield 73% to €30bn, according to UBS 2015.

on financial stability are surging. However, as mentioned, this specific programme with focus on corporate bonds was never implemented before, so no one can predict it with certainty given the markets sensitive to every type of information in the market (as e.g. political conflicts, wars or even natural disasters). Also, as it is usually thought, the effectiveness in this kind of situations cannot be evaluated with certainty, given that there is no counterfactual benchmark.

For quantitative understanding of expected and already verified impact, there will be applied the financial model used by Gibran Watfe[4] to study an impact on 10-year sovereign bond yields during the SPP. This model is based on Bollerslev developed in 1986 and commonly known as GARCH model. Based on the relevant literature, it is considered to be the most adequate for time series data because of it characteristics. There were incorporated some relevant variables such as: announcements, amounts purchased and macroeconomics. Generally talking, research will mainly focus on five European countries corporate yields (Portugal, Spain, Italy, France and Belgium), however, that is some instance will represent global overview on the Eurozone expectations and changes. Also, there will be made clear distinction on the Investment Grade (IG) and High Yield (HY) credit rated bonds that will allow to conclude on the significance of results on HY bonds, while the IG bonds did not suffer large changes.

The structure of this paper doesn't differ from standard researches. First of all, there will be provided some literature review. After that, to understand in more details a general purpose of QE, a brief description of the situation will be presented. Secondly, economic environment and the factors that took the ECB to implement CSPP will be discussed, taken into more consideration the financial markets effect. Thereafter, there will be given the main background of the CSPP, and to finalise, there will be implemented quantitative event-study on the corporate yields, mainly on announcements and purchases, with consequent analyse of obtained results.

[4] Gibran Watfe is an Academic Assistant in the Economics Department of European Economic Studies at the College of Europe (Bruges).

Literature Review

During the last decade, the QE programs were largely implemented mainly by Fed and ECB, however, the impact can be verified on all continents. Thus, this theme became notably popular in the research world, although, the QE strictly directed into the corporate sector is the innovative move.

Generally talking based on recent studies, the announcement impact is considered the most significant during the implementing of the programme[5], in this way supporting the presence of the efficient-market hypotheses (i.e. immediate absorption of the available information by the market participants). Thus, in some instance it is possible to argue that the main objective of the QE programmes is not real purchase of financial assets, but the investors' behaviour regarding the CB´s proposed policy. Channels as scarcity, duration risk and portfolio rebalancing are considered the most adequate explanation[6].

Recently, the ECB[7] studied effects of unconventional monetary policy implemented by Fed (QE1, QE2, MEP and QE3), and again, there was noted a significant and persistent negative change in the target assets (government bonds)[8] around the announcement dates.

In general terms, some experts compare CSPP to CBPP[9] in its implementation (market share, investors' objectives, market expectation), so let us look at CBPP. After implementing 2009's CBPP generally there was verified a significant effect[10]: a sharp decrease in covered bond

[5] See Bauer and Rudebusch, 2014.

[6] For example, in the beginning of the APP when the PSPP was announced (22 Jan 2015), government yields fell drastically even before the announcement, however, the most significant fall was felt on the announcement day, when the bond yields achieved its one year lower bound (see Cœuré, 2015). Also, Georgios Georgiadis and Johannes Gräb from ECB found significant financial market impact on the announcement on 22 January 2015 for Eurozone. European equity returns explained by the portfolio rebalancing increased by 1.65% and the Euro exchange rate decrease by 1.78%.

[7] Carlo Altavilla and Domencio Giannone, August 2016 "The effectiveness of non-standard monetary policy measures: evidence from survey data.".

[8] 55, 66, 84 and 58 basis points, respectively on QE1, QE2, MEP and QE3.

[9] Covered Bond Purchase Programme (for more details about the programme see Annex 2 - WP additional).

[10] ECB Occasional Paper "The impact of the euro systems CBPP on the primary and secondary markets", January 2011, by John Beirne, Lars Dalitz, others.

spreads (12bp at the euro area level), increase on liquidity level (decrease of bid-ask spread) and consequent decline of the respective yields.

Generally, the main objective of this research is to contribute to the literature regarding the CSPP. Given that QE programs have the common objective – to stabilize the economy with special focus on interest and inflation rates, the expected result should be similar as previously mentioned. So to prove it, firstly, the market-efficiency hypotheses will be studied (i.e. showing that the announcement effect is the most relevant). And secondly, the impact on corporate yields will be generally tested (financial, non-financial, IG and HY) as well as consequent analyse of the indirect impacts (as portfolio rebalancing).

Brief Introduction into the Situation

During the pre-crisis period and due to wrong expectations about the future (i.e. productivity growth), households, enterprises and even governments accumulated large quantities of debt.

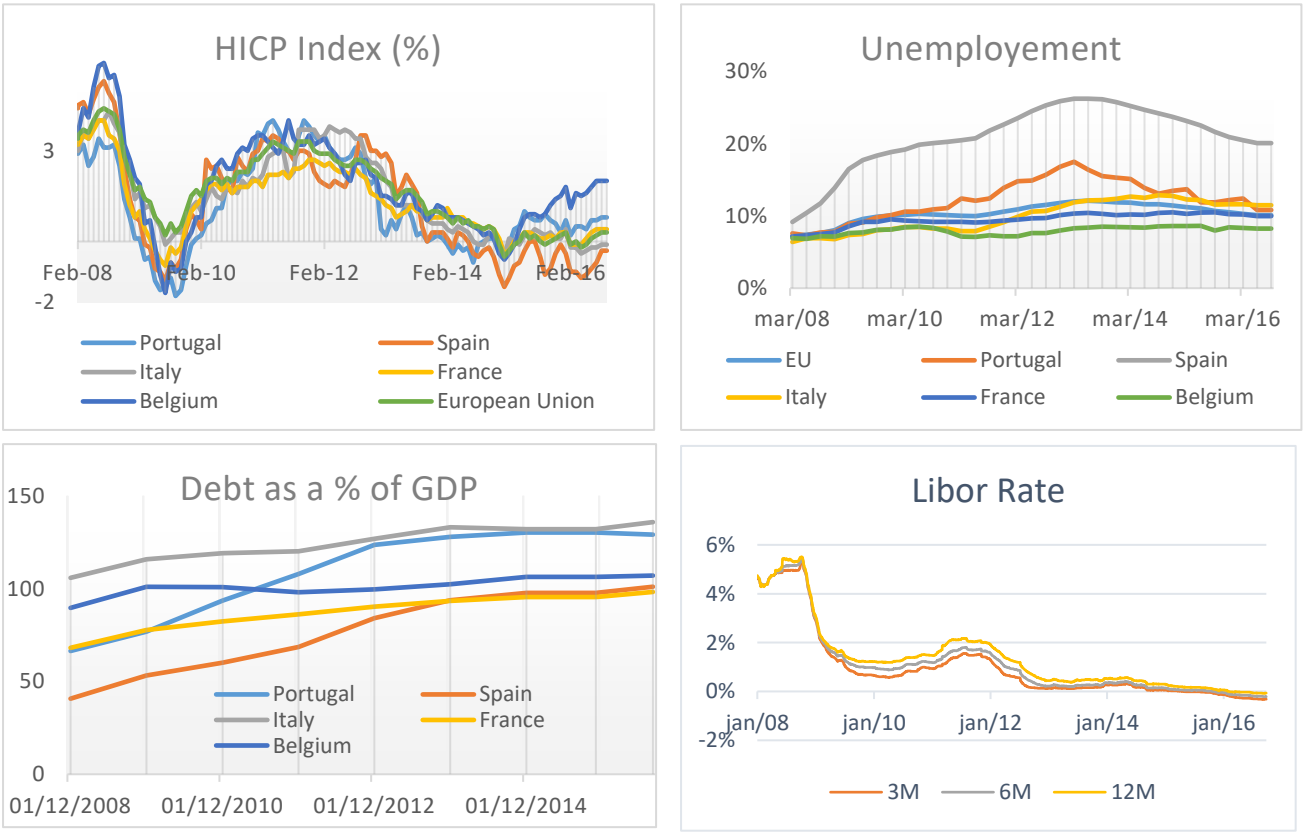

Figure 1- Main economic statistics

The main consequence during the post-crisis is an abrupt decrease in the investments given the need of repairing the financial position. Also, a significant impact on global economy lead the monetary policy to practice low levels of interest rates, that are still verified today.

Relatively long period of low inflation, interest rates at its lower bounds and depreciation of the European economy after crisis of 2008 (*Figure 1*) led the European Central Bank (ECB), headed by Mario Draghi, to interfere again in the monetary policy on June 2016[11].

Given the situation with approximate zero interest rate, took the ECB to resort the unconventional monetary policy measures. It is important to note that the central banks cannot decrease the nominal interest rate much below zero, firstly because savers (corporates or households) would withdraw the money from financial institutions, given that keeping money at "home" would have higher return. In this way, there were undertaken and extended non-standard measures of the Asset Purchase Programme (APP), also generally called Quantitative Easing (QE)[12]. The main target of QE is to lower interest to impulse investment and decrease savings. The implementation already started on October 2014[13] with a third covered bond purchase programme (CBPP3) that was chased by an asset-backed securities purchase programme (ABSPP) on November 2014, and the last one, in March 2015, was established a public-sector purchase programme (PSPP). This time it was called Corporate Sector Purchase Programme, which decision came into force on 6 of June 2016. In this stage, six European national central banks acting on behalf of the Euro-system will carry out the CSPP[14], this is,

	ABSPP	CBPP3	CSPP	PSPP	APP
Holdings* September 2016	20,672	194,304	29,722	1061,244	1305,942

Figure 2 - Distribution of monetary sources pre-programme at amortized cost, in euro million, at month end.

[11] Note that ECB already tried to influence European economy in 2009 (see Annex 2 – WP additional).

[12] It includes all purchase programmes under which private and public sector securities are purchased to address the risks of a too prolonged period of low inflation and interest rates.

[13] The ECB is the latest central bank that jumped on board the QE bandwagon, with monthly purchases rose from 13 to 60 billion euros.

[14] Banque Nationale de Belgique, Deutsche Bundesbank, Banco de España, Banque de France, Banca d'Italia and Finlands Bank, each responsible for several European countries.

conduct purchases of investment-grade bonds issued by euro-area non-financial corporations (on primary[15] and secondary markets).

Expended APP consists in monthly purchases in private and public sectors of securities issued by European institutions like government bonds, asset-backed securities, covered bonds, and from the beginning of June - corporate bonds as well. During the last interference by ECB (CSPP), the amount available for all purchasing increased from €60 billion to €80 billion per month, that is intended to be carried until the end of March 2017, with possible changes until the Governing Council sees the expected changes in the inflation rate, that should achieve 2% over the medium-term.

As it is possible to see from *Figure 2*, ECB bet extremely large quantities on the Public-Sector Purchase Program. However, just taking into consideration the amount of money injected by each programme should not make us conclude as to the efficiency, given that the dimensions of the markets are very different and the perception of each market by investor is different too.

How did we come to QE?

Central Banks, like ECB or Fed, are the key drivers for regulation of money supply in economies to ensure their well-functioning. The main responsibilities are maintenance of the price stability over the time and regulation of the interest rates that in turn should create consistent growth and employment. So, what CBs do is essentially regulation of the monetary policy, i.e., buying and selling debt from the public or by lending money to public. By this way increasing the amount of currency and bank reserves in the economy that consequently will influence the key economic drivers as inflation and interest rates mentioned before.

Before the last financial crisis, with purpose of keeping inflation and fight against some economic instability, CBs were adjusting the overnight rate at which banks could borrow and lend. It was easy: if the expectation about future was negative, the CBs would reduce the

[15] Accordingly the CSPP Q&A, injection into the primary market "will aim at striking a balance between the objective of the programme and the need to ensure continued market functioning".

overnight rate, that way enable to make more loans and consequently boosting or maintaining inflation according to the economic perspectives.

Since 2008, it has been possible to observe sharp reduction on lending by banks, that could be justified by larger retention of cash on reserves due to low interest rates and consequent reduction of money supply in economies. Thus, it did not make any sense for financial institutions to lend more money that consequently cut the creation of new money. It is important to note that the main idea is that banks are creating money for the economy by making loans. One of the consequences of shrinking supply is deflation, that in turn will have an adverse effect on the economy and that nowadays is the main preoccupation of governments.

In the case of Fed, for example, the first reaction to low inflation was to increase the demand of loans by making the interest rates lower. However, it was not sufficient and money supply continues to decrease. After inefficient and also impossible implementations of these technics, i.e., after policy rates reached zero lower bound, and also due to the increased complexity of the economy, this measure was not sufficient alone[16]. One of the theoretic explanations could be the decrease in confidence about the future stability. Thus, it was necessary to respond beyond the change on interest rate with more unconventional instrument, and the alternative was the QE – injection of cash into the banks reserves that would be made through intensive buying of debt securities, and consequent increase of money supply.

Corporate Sector Purchase Programme - CSPP

Last June (2016) ECB started to implement the innovative weapon to react against the undesirable movements into economy implementing CSPP. However, there were already some rumours about this unconventional monetary intervention in this sector by the ECB, and the

[16] One of the lessons taken by Svensson from financial crisis is that "the price stability is not enough to achieve financial stability, but interest rate policy is also not enough to achieve financial stability, so a separate financial stability policy is needed for financial stability" (Monetary Policy after the Crisis, Lars E.O. Svensson).

turbulent beginning of the year[17] contributed to its decision. It was the first time that ECB intervene by purchasing corporate bonds to support the euro area corporate sector in the credit easing conditions, so the expectations were positive in general, however there were also some doubts about its effectiveness.

According to the information provided by ECB, there are estimates that the CSPP will englobe non-financial bond market of approximately €6oo to €700 billion (targeted market[18]) and the perspective is to purchase about €5 billion per month until March 2017 (i.e. during one year of programme the targeted corporate bond market may enlarge by 10% or 7% of the entire non-financial euro-dominated corporate bond market). Thus, it is a sizable operation and is worthy of impacting the market. Until the date, the biggest part of purchases is directed at Industrial (28%) and Utilities (22%) sector, and the size of purchased bonds is 58% for bonds amounting less than €10 million and approximately 8% fitted into bounds above €50 million (ECB source). Since the unveiling of CSPP on March, it has been possible to see a drastic decrease in the European corporate yields even without complete details about the programme as will be discussed below. But the program comes with risks. Some investors are concerned that the ECB could own so much of the market that it becomes difficult to buy or sell, and again some analysts warn of a bubble in debt markets.

Economic Importance of Corporate Bond Market

Nowadays, not everyone can yet understand the importance of the corporate-bond market and how it can create growth for the economy, for companies and for investors (government or private). These markets (domestic and international) link efficiently corporates that need funding and the investors around the world, preventing in some instance the new market turmoil similar to 2008. That is why there is big preoccupation about this market.

[17] Turbulence of commodity prices (Oil), bad news from China regarding its growth and unexpected "Brexit" put uncertainty into the financial markets and consequently into credit markets too.

[18] Targeted market – non-financial, no more than 70% of any individual bond issue, and for more details see Questions and Answers (13.05.16) https://www.ecb.europa.eu/mopo/implement/omt/html/cspp-qa.en.html.

After the beginning of the financial crisis the amount of the issued bonds had been increased comparatively to the bank loans[19], that consequently means increase of confidence and adequacy of this market to the needed parts. It is very convenient to the market in sense that it reduces company´s reliance and exposure to the banks, and in the turmoil periods, may be source of money pulsation. Generally, corporate bond markets, especially for non-financial institution, are recommended by World Bank, mainly because they shrink the cost of intermediation between issuers and investors and help in managing the cash flow allocation.

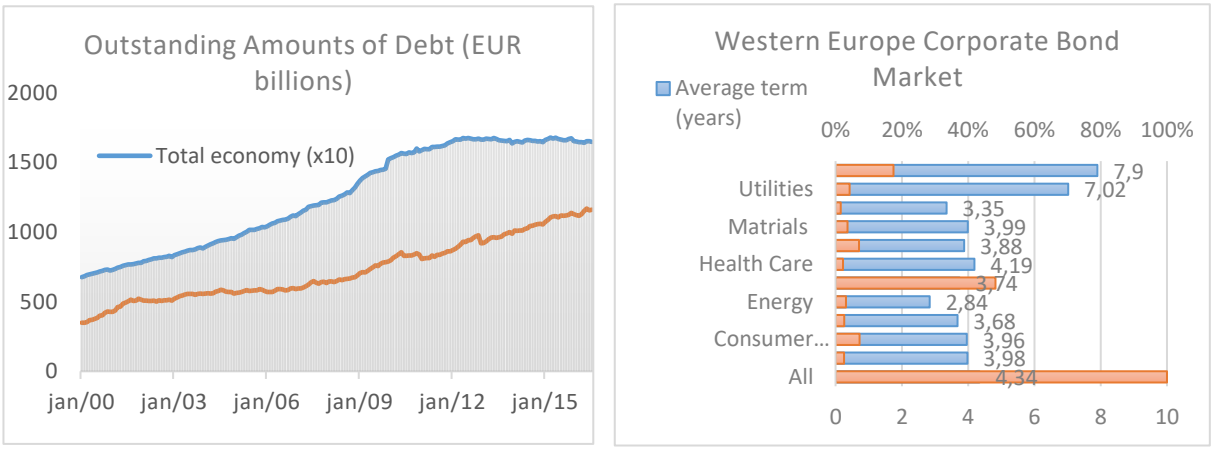

Figure 3 - General statistics of Corporate Bond Market

Altunbas and Kara[20] studied evidences relatively to the behaviour of firms regarding the debt preferences and availabilities. The main conclusions that could be made are that European firms´ decisions on the type of debt are positively related to its size, profitability and financial leverage. Also, they support previous evidence demonstrated by other authors that, in the beginning of its "life" and until establishing its credibility on the markets, firms mainly resort banks financings that is more restrictive and expensive, just after gaining some scale and reputation, the different kind of options opened, as a case of corporate bond market.

The principal advantage for corporates of entering the corporate bond market is its security, stability and flexibility that allow them to achieve the objectives easier. Also, the wider range

[19] Economic Importance of Corporate Bond Markets by ICMA, March 2013. Global perspective.
[20] Bank of England Working Paper Series, nº 1028. March 2009. "Large Debt Financing Syndicated Loans Versus Corporate Bonds" by Yener Altunbaş Alper Kara and David Marqués-Ibáñez.

of creditors can access the investment, so there are larger diversification and "competition" that consequently results in market efficiency. Note, there are different kinds of substitutes where companies can pick up capital (e.g. equities, banks). Thus, the cost of funding is considered the main characteristic of decisions, in which the bond issuers are considered low cost capital.

The corporate bond market is used by different types of investors to sustain their portfolio decisions and diversification of the risk. However, it is especially used by the investors who usually do not expect relatively large returns (as in equities for example), but instead look for consistent, predictable and relatively secure future cash flow. The sustainability and efficiency of the corporate-bond market can be justified by the high levels of transparency and standardised documentation required to participants that consequently leads to reduction in costs and consequent encouraging of credit[21].

Importance of interest rates and inflation – negative and low

Why do central banks constantly worry about the inflation and interest rate? The explanation looks obvious. The objective of CBs is to create an economic growth. To do so, it is important to convince individuals and enterprises to invest into economy that essentially depends on these two key-factors. In general terms, inflation is the rate at which general level of prices for goods and services rises. So, why is a negative or low inflation[22] rate a problem nowadays? Firstly, because we should look at deflation not as a decrease in purchase price but as an increase in a loans' prices that consequently slow down the investments, despite the increase on the purchasing power[23]. On the other hand, low and negative interest rates as consequence of the policies to fight periods of deflation is doubtful, but positive for economy. Basically, low rates encourage investors to invest (increase propensity to save) while relatively high restrain them.

[21] Discussion on Bank Loan Vs Corporate Bond see Annex 2 – WP additional.
[22] During the history, there are different economies that have troubles related with the deflation, however, there are two most affected economies that lived negative inflation rates after 1950s, Japan (1995-2013) and Hong Kong (1999-2004). Both cases were caused by an unwinding of inflated asset prices.
[23]Real Interest Rate = Nominal Interest Rate – Inflation.

Also, it can be analysed from the borrowers' perspective, as low borrowing rates will encourage them to borrow and consequently invest into economy (it could be verified during the Great recession). Thus, central banks try to manage the interest rate according to the economic situation. Lastly, it is possible to observe high turbulence on financial markets and in economies in general, that is closely related to the low, and in many cases, negative interest rate (*Figure 4*). This behaviour was in some instance expected, given the decrease intention of the interest rates since 90s[24].

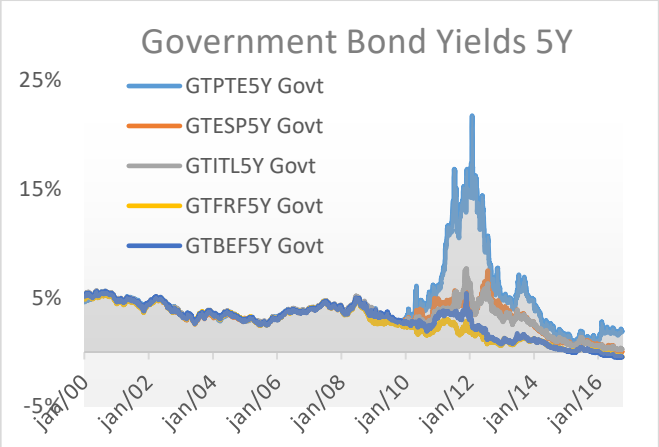

Figure 4 - 5Y Government Yields (2000-2016)

After analysing some academic researches and opinions of analysts, there is clear evidence regarding the relevant concerns about policy with negative rates implemented nowadays. The idea is that this kind of measure can prejudice the economy more than help in the medium-long terms (bank's profitability, volatility in the financial markets, others). In this sense, central banks should make the choice between supporting borrowers or lenders. From the point of view of Benoît Cœuré[25], the choice was the borrowing part, defending in this way that "poor investment opportunities are simply one of the many manifestations of a deep recession" and added "higher monetary policy interest rates would only have depressed the economy further, delayed the recovery and contributed to downside risks to price stability".

Regarding the negative rates, first impression is that savers should pay to hold or invest their money and borrowers get paid, that do not make a lot of sense at the first sight. However, it is true, and the aim of this monetary policy is to strength economy in the way of encouraging

[24]Vítor Constâncio, Vice-President of the ECB, argued: "Low rates are the result of real economy developments and global factors, some of which are of a secular nature and others relate to the financial crisis".
[25] Benoît Cœuré is member of the Executive Board of the ECB, at the International Center for Monetary and Banking Studies. Oct. 2013. Source: https://www.ecb.europa.eu/press/key/date/2013/html/sp131009.en.html.

banks to direct and indirect lending, given that holding money will be more expensive. Impact of the negative rates will not be directly observable on household accounts, as this policy is applicable for borrowing and lending between banks. However, it will be a consequence factor, given that the negative rates[26] will influence negatively the profit margin of banks (lending and deposit rates)[27]. For example, in case of commercial banks, the first reaction to negative rates could be the self-holding of the real money. However, it demands high physical safety, thus in some cases they must pay to central banks to hold the money or lend to other banks.

Methodology

The model used is based on GARCH model – generalized autoregressive conditionally heteroskedastic - developed by Bollerslev and Taylor, 1986, given that according to the literature, is the "most efficient and appropriate of the time series of changes spreads"[28].

The main objective of Bolleslev was to design the model that could capture features of financial data time series. GARCH model is widely applied in econometric and statistic modelling of time series because of its simplistic assumption, essentially in non-linear forms, and at the same time significant efficiency. In the first place, it allows calculation of variance based on the past and available information that drastically simplifies calculations. It is important to note that the forecast of volatility is the most complicated and essential measure in finance and econometrics world. And secondly, it also assumes error term distribution with zero mean (conditionally homoscedastic) and unconditionally heteroskedastic variance. The stationarity of change in spread of corporate bonds (dependent variable to be studied), the positive autocorrelation and volatility clustering of the time series data used common feature of financial data volatility that is highly influenced by time dependence, support that choice (*details in Annex 1).*

[26]Nowadays, there are approximately 40% of outstanding European government bonds with negative yields (source Dutch Bank, Bloomberg).

[27]Approximately 60% of Euro-area banks total income is represented by net interest and 30% of net fees and commissions (Source: ECB Statistical Data Wherehouse).

[28] Gibran Watfe, from Department of European Economic Studies, applied this model to study impact on 10-year sovereign bond yields by APP (Security Market Programme, Outright Monetary Transactions and PSPP).

Model

As was mentioned before, the main objective, is to test the announcement (stock effect) and implementation (flow effect) effects on Corporate Sector Purchase Programme. Thus, the main independent variables of the model should be Announcement and Purchased Amount variables. After verified some dependence of dependent variable, there also was included one lag variable. According to the relevant literature, the studied model will include control vector (V) in order to complete the model in indirect way. The main objective of this vector is to reflect the impact of determinant factors that could influence the corporate yield in indirect way. The vector englobes four general variables that, on one hand, are key representatives of the economy and, on the other hand, are the essential factors that set up the corporate bond yields. Generally, it includes such variables as inflation expectation, country credit risk, liquidity risk, common market uncertainty and equity market return, given that is one of its substitutes.

$$\Delta S_{i,t} = \alpha_i + b_i AV_t + c_i PV_t + d_i \Delta S_{i,t-1} + e_i V_{i,t} + \varepsilon_{i,t} \text{ (1)} \qquad \varepsilon_{i,t} \sim N(0, \sigma_{i,t}^2) \text{ (2)}$$

$$V_{i,t} = \{CESI, 5y5y, CDS_i, Eqt_{t,}, \} \text{ (3)} \qquad \sigma_{i,t}^2 = \alpha_i^* + \theta_i \varepsilon_{i,t-1}^2 + \gamma_i \sigma_{i,t-1}^2 \text{ (4)}$$

After analysing the financial data from the statistical perspective (normality, autocorrelation, others), it was decided to concentrate on changes in bond spreads instead of bond spreads. Based on literature, the opinions regarding the interval over which the change should be computed differ. Some argue that the largest time series intervals are noisier, when others defend the poor efficiency on capturing the monetary policy effects[29]. However, as the original model, here it also will be modelled as two-days change in corporate bond spreads[30].

Data

Most of data were obtained via Bloomberg and ECB website. The range of data is from January 1st, 2014 to September 30th, 2016 (715 daily observations). Although according to the literature

[29]Hausken and Ncube, 2013, p. 25.

[30] This methodology is also applied in relevant literature as Szczerbowicz (2014), Hausken and Ncube (2013), Carlo Altavilla (2016)).

the dataset is used to be much longer, obtained results look relatively understandable and explainable compared to other similar studies[31].

There were used daily data for 5/10/15/20-year corporate bond yields of five European countries that in some extent will represent the behaviour of Eurozone area to the CSPP (Portugal, Spain, Italy, France and Belgium). To transform the corporate yield into spreads, German government yields were used, and consequently, took two-day changes.

Announcement variable (AV) is an impulse dummy variable (equal to 1 on the announcement day). There were selected seven announcement days strictly related to the CSPP, retired from the ECB website and double-checked with other sources. The significance of the chosen dates where based on the intensity of discussion on the markets and officially registration by ECB. Another direct variable is the amount of the corporate bonds purchased (PV) by ECB and its collaterals. The data was obtained via Bloomberg and double-checked with the ECB website information. Since available data are on weekly basis, posteriorly they were transformed onto daily basis assuming equal distributed purchases during the week.

The first variable included into control vector is CESI (Citigroup Economic Surprise Index) for the Eurozone. CESI represents the prior economist expectations of the economy news. Negative values mean that the market expectations were beyond the coming news[32], while positive values are interpreted as positive surprise on the coming news. The importance of this variable is significant, given that asset prices and consequent investors' decisions depend a lot on market expectation and interpretation of the available information[33]. The coefficient of CESI in model is expected to be negative, given that positive news for investors, theoretically will constrict spreads on corporate bonds.

[31] It was not possible to obtain more historical data on corporate yields.

[32] Note that when the CESI is declining, it doesn't necessary mean that the general economy is weakening, it just means that data is surprising on downside.

[33] Howard Simons (2015), president of Rosewood Trading, in his report "Are you wise to the surprise index?" did not find significant relation between CESI US index and two indexes of HY corporate bonds. His explanation was: Combining negative relationship between CESI and corporate bonds' risk-free rate exposure and, on the other side, the positive relationship between the index and its credit-risk, the expected result should be non-significant.

Inflation expectation and bond yields are directly related, mainly because the stream of future cash flows demanded by bond holder, will strongly depend on inflation expectation (purchasing power), so bond holder will demand higher yield to be compensated for inflation risk. Thus, in the model above, the expected coefficient should be negative, given that positive change in inflation expectation should be followed by negative changes in the corporate spreads. Based on literature, central banks and dealers, the medium-term inflationary expectation is commonly based on the 5-year-5year forward interest swap (see Blackstone, 2014). The model englobes two variables of this type, forward interest rate for global European economy and specific for each country.

To determine the stability of the country, more specifically its default risk, CDS premiums were used[34], given that it plays crucial role in investment decisions. As mentioned before, increase in credit risk is supposed to increase corporate yield, thus there is a direct relation.

Finally, control vector also included equity index of each country. This inclusion was based on the relevant literature (such as Falagiarda and Reitz, 2015), that consider equity investments as a possible alternative to bonds. In some instance, equity indexes of country represent stability of domestic market that consequently will be transferred for other classes of the markets (rebalancing portfolio channel). Given the last years' turbulence on financial markets, investors are searching for stable and more profitable investment opportunities that equity markets can offer in long-terms, there should be verified indirect correlation with change in yield spreads.

Results and Analyses. Model effectiveness

In order to test the model for its efficiency, accuracy and possible sub-estimation, main tests were implemented. Firstly, it is important to point out the effectiveness of the model. Given that the measure of accuracy of the regression to explain the historical variation of the dependent variable (adjusted goodness of fit) is extremely high to the financial time series, generally

[34] According to Gibran Watfe (2015), CDS premium (Credit default swap) is a good proxy for the countries default risk.

situated between 30%-60%. In this way, the model captures extremely well in-sample changes on spreads of corporate yields.

As expected in financial data, non-normality of errors was verified. However, the central limit theorem is applicable, that states that the sample mean coverages to a normal distribution.

Regarding the stationarity, well-known Augmented Dickey-Fuller test (ADF) was applied, i.e., testing if the series data is dispersed around the constant mean – presence of unit root. Based on the results[35], generally there are no problems with stationarity.

Accordingly to the Bollerslev and others, financial time series are used to contain some degrees of the serial correlation (autocorrelation), that is the problem given that it will influence the regression that consequently may underestimate the standard error of the coefficients (i.e. predictors can seem to be significant when they may not be.). Thus, it was important to investigate the model in this direction. First, based on the Durbin-Watson[36] test the data available, as expected, shows evidence of serial correlation, although, based on visual presentation of the ACF and PACF it does not look so serious[37].

With the purpose of testing the accuracy of the model, the regression also was tested on autoregressive conditional heteroscedastic (ARCH) effect, given that an uncorrelated time series (as verified before) can still represent serial dependence due to presence of variance clustering. Generally, the aim of this test is to comprehend if regression residuals are dependent or not on its own lags. It is frequently called serial correlation of the heteroscedasticity and because of this, there are some who argue that ARCH effect is in some instance a measure of the asset's risk[38]. Based on the results, the regression´s residuals don't present significant volatility clustering. Thus, generally there no significant warries about the model accuracy.

[35] All result can be found in Annex 1 – Results).

[36] see https://www1.udel.edu/htr/Statistics/Notes816/class20.PDF for more details.

[37] In this respect, Field (2009) argues that only values under 1 or more than 3 of the Watson variable should be taken into the consideration, that is not this case.

[38] For this purpose, it was used Engle´s ARCH test to test the significance of ARCH effect – Annex 1 - Results.

Before plunging into the discussion of the estimated model results, let us look at real corporate yield effect, in order to give the first insight into the situation. Firstly, during two years of available data, corporate yield spreads generally were decreasing and since the middle of 2015, represented turbulent changes in their behaviour. Regarding the first announcement day, that is considered the most meaning[39], there was observed significant change on corporate yield. Generally, announcement effect for shortest maturities (5/10y) had quickest effect[40] compared to 15/20y corporate yields (*Figure 5*). However, after 6 months (30 Sep 2016), corporate yields for longest maturities had relatively more significant impact compared to the 5 years' yield. Relatively the credit risk of the bonds, there was observed that HY bonds have more significant impact on both situations (short and long maturities).

AVERAGE REAL IMPACT		Maturity				Bond type	
		5	**10**	**15**	**20**	**IG**	**HY**
25.02-24.03	2 W around the announ. Date	-21,2%	-19,1%	-15,3%	-8,0%	-17,5%	-19,8%
25.02-30.09	2 W before & until 30.09.2016	-25,4%	-51,2%	-46,7%	-27,8%	-32,9%	-40,9%
25-05-17.06	2 W around the purchase date	25,60%	11,11%	6,97%	5,16%	20,49%	9,47%
25.05-30.09	2 W before & until 30.09.2016	61,99%	48,54%	36,72%	20,07%	59,69%	31,55%

Figure 5 - Announcement and Purchase Effects (See Annex 1 – Model Implementation for detailed information)

Regarding the purchase effect (08.06.2016) on corporate yield, again there was observed decrease of the impact with maturity of bonds (*Figure 5*). Even after 4 months, the results were similar in scale of significance. On the other hand, without taking maturity of the yields into the consideration, the IG had more meaning impact in both case.

Also, in way to support the literature it is important to highlight the significant impact on equity return (negative during the announcement date and positive during the real purchase date, that is according to the results presented below). Based on the literature, this is justified by the portfolio rebalancing of the investors. Regarding the exchange rate, in both situation there was

[39] At Annex 1 – Model Implementation, it is possible to find result on other announcement dates related to CSPP.

[40] In this sense effect is measured by the percentage loss of its initial value.

verified straightening of the EUR regarding the US dollar (*Figure 6*), that can be explained by investors positive perception about the EU economy.

	Data	PSI20	IBEX	FTSEMIB	CAC	BEL20	EURUSD
Announcement effect	25/02/2016	4661,93	8215,6	17104,54	4248,45	3338,07	1,1022
	10/03/2016	4881,73	8766,9	18118,23	4350,35	3355,04	1,0978
	24/03/2016	5098,14	8789,8	18165,84	4329,68	3368,9	1,1168
	Total	**9,4%**	**7,0%**	**6,2%**	**1,9%**	**0,9%**	**1,32%**
Purchase effect	25/05/2016	4938,6	9125	18201,39	4481,64	3491,99	1,1144
	08/06/2016	4825,88	8831,4	17909,7	4448,73	3543,5	1,1373
	22/06/2016	4621,03	8702	17323,27	4380,03	3452,83	1,1291
	Total	**-6,4%**	**-4,6%**	**-4,8%**	**-2,3%**	**-1,1%**	**1,32%**

Figure 6 – Indirect real Impacts on Announcement and Purchase date (See Annex 1 – Model Implementation for details)

In relation to the liquidity (represented by AKS-BID spread), that with respect to the European commission should increase (i.e. decrease in ASK-BID spread), there were noted interesting results. First of all, generally announcement impact of 2 weeks around the first date was negative, while during the same period around of purchase date was positive, that is linked with the model´s result presented below. However, until the end of September 2016, only HY bonds maintained it decrease, while IG bonds increased theirs ASK-BID spreads (*Figure 7*).

AVERAGE REAL IMPACT		Maturity & Bond Tipe			
		HY		IG	
		5	**> 5**	**5**	**> 5**
25.02-24.03	2 W around the announ. date	-7,95%	-3,07%	-3,90%	-8,85%
25.02-30.09	2 W before & until 30.09.2016	-14,71%	-2,63%	32,15%	46,70%
25-05-17.06	2 W around the purchase date	3,82%	3,64%	2,32%	60,86%
25.05-30.09	2 W before & until 30.09.2016	-3,07%	-0,91%	9,60%	15,15%

Figure 7 – ASK-BID spreads real change (See Annex 1 for detailed information)

Finding and discussion of the model results

After implementing the model based on the 5/10/15 and 20 years' corporate bonds of different credit ratings and countries, there can be taken some interesting results (*Figure 8*):

- Significant impact was generally verified mostly on short-term yields (5-year). It makes sense, given that the ECB is concentrated more on short-term debts.[41]

[41] Based on analyses of KBC bank, average maturity of the corporate bonds affected by CSPP will be bond until 5 years. They argue that 55% of the outstanding bonds mature until 2021, 74% of the bonds mature until 2023 and only 9% of outstanding bonds mature more than 10 years from now. And based on the BB the average term of the European outstanding bonds is 4.34 years.

- CSPP englobe, according to the ECB's description of the programme, just non-financial issuers bonds, however according to the model, it did not influence investors behaviour.
- Regarding 5y maturity bonds, there was verified more significant impact (at 5% of significance level) on Hight Yield bonds and not on Investment Grade (note: programme englobes just IG bonds[42]).
- Announcement effect, as expected, represented more significant impact compared to the real purchases. Here it was possible to find characteristics of market efficiency.
- Generally, the announcement impact was negative on Change of Spreads (on shortest maturities), in HY and IG, while on real purchases it was mostly positive. It means that announcements of corporate bond at European markets had expected impact on corporate market, i.e., corporate yield decreased in relation to the government bond, that consequently should make the corporates invest more, that is the main objective of the programme. Regarding the real purchase effect, it was not expected, and the explanation could be the indirect politician events as Brexit, US elections, China´s summer turmoil, immigration due to wars in Asia, others.
- Majority of the variables considered in the model had significant impact on changes of spread (that why the adjusted R^2 is so high) and also moved in the expected direction.

Maturity	Variable	Non-Financial				Financial	
		HY		IG		HY	
		Significant	< 0	Significant	< 0	Significant	< 0
5 years	Announcement	70,6%	76,5%	34,6%	100,0%	71,4%	92,9%
	t-test*	**4,675**	**-4,232**	**1,804**	**-1,804**	**3,637**	**-3,906**
	Purchase	52,9%	47,1%	3,8%	19,2%	28,6%	7,1%
	t-test*	**2,883**	**-3,864**	**1,037**	**-0,846**	**2,477**	**-1,600**
> 5years	Announcement	29,2%	54,2%	28,0%	56,0%	35,7%	85,7%
	t-test*	**2,813**	**-3,720**	**1,469**	**-1,453**	**2,564**	**-2,949**
	Purchase	20,8%	33,3%	20,0%	60,0%	28,6%	57,1%
	t-test*	**1,003**	**-0,320**	**1,833**	**-1,744**	**1,636**	**-2,616**

Figure 8 – Model's Results (See Annex 1 - Results for detailed information)

[42] Minimum rating of BBB- or equivalent obtained from an external credit assessment institution according to Guideline ECB/2014/60;

Robustness tests

In order to proof the results presented above, several robustness tests for 5 years bond were implemented as : change of the dependent variable from two-day changes in corporate bond spreads to one-day change (test 1); the amount of the real purchases was used at weekly bases (test 2), given that ECB unveils this information on weekly bases; use of domestic government bond in order to compute the spread (test 3) and finally the sample was reduced to one year in order to catch better the impact of monetary policy, more specially CSPP (test 4).

Generally, as can be observed on *Figure 9*, all scenarios support the initial finding about the higher effectiveness of the CSPP on HY compared to the IG. The announcement impact continues to represent more significant impact, while purchases continued to represent positive change in corporate yield spread, that should not make sense accordingly the expectation, but as mentioned before, lastly various unexpected and negative economic surprises could influence fixed income markets in an opposite way. Regarding the test 3 (spread computed on domestic government bonds), there was a drastic decrease in the efficiency of the results, that for this purpose should be taking into the consideration with significant caution. Thus, generally there were not found significant mismatches in robustness's results regarding the principal--model results.

Variable		Non-Financial			
5 years' bond		HY		IG	
		Significant	< 0	Significant	< 0
Test 1	Announcement	56,3%	75,0%	38,5%	96,2%
	Purchase	31,3%	50,0%	7,7%	19,2%
Test 2	Announcement	62,5%	81,3%	46,2%	96,2%
	Purchase	43,8%	43,8%	11,5%	26,9%
Test 3	Announcement	25,0%	43,8%	0,0%	19,2%
	Purchase	0,0%	31,3%	3,8%	7,7%
Test 4	Announcement	75,0%	31,3%	88,5%	38,5%
	Purchase	43,8%	0,0%	53,8%	15,4%

Figure 9 - Robustness's tests *(See Annex 1 - Results for details)*

Conclusion – What to retain

One more time the main question remains the same: was CSPP the right choice as reaction to uncertainty and instability of the European economy? Based on the research papers and economic evidences, there has been evidenced the easing of borrowing conditions since the beginning of APP (2014), with decrease in dispersion of interest rates across countries.

Throughout the research, it is possible to understand that most of the indicators, findings and opinions of professionals support the effectiveness of the programme, supporting in this way previous research results on QE policies. However, CSPP is a part of the APP that also is a part of the Monetary Policy (QE) developed by ECB during the last years. Thus, it is not scientifically correct to affirm the significance of the CSPP as a single programme. However, maybe it is the coincidence, but the inflation rate of Euro Area (HICP Index) has been increasing constantly since the announcement of the CSPP on March 2016, from -0.2% until 0.6% verified nowadays (30 November 2016). Remember that the main cause of launching the APP was low inflation rate that had been decreasing since 2011.

To close the research, firstly we all should agree that implementation of the programme makes a lot of sense. ECB "injected money" in direct way, i.e. lent to non-financial corporates, in order to fulfil incapacity of corporates to invest, and consequently, to develop own business, due to high financial cost and economic uncertainty, as argued before it worked.

Based on implementation of the GARCH model introduced by Bollerslev, firstly there was observed high efficiency of the model, giving more certainty for obtained results. Shortly, there interestingly was found that the HY bonds had more significant impact compared to the IG, however, the ECB announced target was IG bonds. Also, as expected, the announcement impact had mostly significant and negative influence at 5% of confidence level on corporate yields spreads, while the purchase variable represented low significance and moreover, showed positive impact on spreads. According to the programme, only non-financial corporate bonds will be purchased, however and based on the model result, there was not found any differentiation in investors behaviour regarding these two types of bonds. Research englobe bonds with maturities until 20 years, however, only for short-term bonds (5 years) there was generally noted more significant and stable impact on CSPP, that is explained by the ECB initial target on relatively short-term bonds.

Summarizing, CSPP is having a significant and efficient impact on the established target, inflation rate, however, we should keep in mind that every financial market represents high instability and fast absorption of the information.

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[43] Short resumes for more relevant bibliographies at Annex 2 - Literature.